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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/926,228	09/26/2001	Hideo Ihara	011138	2161
23850	7590	11/14/2003	EXAMINER	
ARMSTRONG, KRATZ, QUINTOS, HANSON & BROOKS, LLP			KOPEC, MARK T	
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SUITE 1000			PAPER NUMBER	
WASHINGTON, DC 20006			1751	

DATE MAILED: 11/14/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/926,228

Applicant(s)

IHARA, HIDEO

Examiner

Mark Kopec

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 22-44 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 22-44 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 September 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). ____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____ 6) ☐ Other: ____

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This application is a 371 of PCT/JP00/01699 (filed 3/17/00). The preliminary amendment filed 3/26/01 is entered. Claims 22-44 are currently pending.

The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 22-44 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for superconductive compositions of the formula $\text{CuM}(\text{Ba}, \text{Sr})\text{CaLCuO}$ superconductors (wherein M is required to be present), does not reasonably provide enablement for the broad "selective reduction type high temperature superconductor" as claimed. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention commensurate in scope with these claims. Applicant has provided no other examples or materials useful in the invention, nor does the specification allude to

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such materials. The teachings appear limited to the CuM(Ba,Sr)CaLCuO superconductors (wherein M is required to be present) superconductors discussed above. Undue experimentation would be required for the skilled artisan to arrive at all other materials within the scope of the claimed invention.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 22-44 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Ihara et al ($\text{Cu}_{1-x}\text{Tl}_x\text{Ba}_2\text{Ca}_3\text{Cu}_4\text{O}_{12-y}$ having a T_c of 126 K).

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Ihara et al disclose superconductors of the formula $Cu_{1-x}Tl_xBa_2Ca_3Cu_4O_{12-y}$ having a T_c of 126 K (Abstract; experimental). The superconductors are specifically disclosed as overdoped (Results and Discussion section). Although the reference does not specifically disclose that the superconductors have the instantly claimed "reduction type" properties (charge layer substitutions), the materials/process would inherently possess such properties as they are of identical stoichiometry and critical temperature as the claimed materials. Ihara does teach increased T_c for an optimum doped sample (126K vs 123K for overdoped). However, the reference clearly discloses superconductors of the formula $Cu_{1-x}Tl_xBa_2Ca_3Cu_4O_{12-y}$ having a T_c of 123 K which are specifically disclosed as overdoped. Additionally, the materials are produced by the same/substantially the same methods.

Such a teaching is anticipatory.

Accordingly, the burden of proof is upon applicant(s) to show that the instantly claimed subject matter is different from and unobvious over that taught by this reference. See In re Brown, 173 USPQ 685; In re Best, 195 USPQ 430 and In re Marosi, 218 USPQ 289.

In the event that any minor modifications are necessary to meet the claimed limitations, such as variation in hole

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concentration, such modifications are well within the purview of the skilled artisan.

Claims 22-25, 30, 32-36, 39-40 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Shimoyama (Strong Flux Pinning..) or Shimoyama (Dramatically improved Flux Pinning Properties..).

Shimoyama (Strong Flux Pinning..) discloses overdoped Pb-Bi₂₂₁₂ single crystals (Abstract; Table 1). Samples range from heavily overdoped (T_c 67K) to optimally doped (T_c 96K) (Abstract; Table 1). The overdoped samples/process of preparing appear to meet each of the instantly claimed limitations.

Shimoyama (Dramatically improved Flux Pinning Properties...) discloses heavily doped and moderately carrier overdoped Bi(Pb)₂₂₁₂ single crystals (Abstract; Table 1). The reference specifically teaches that overdoping increases J_c and decreases T_c (Introduction). The overdoped samples/process of preparing appear to meet each of the instantly claimed limitations.

These references either specifically or inherently possess the instantly recited "doping state" concentrations as evidenced by their stoichiometries and their overdoped state.

The references are anticipatory.

In the event that any minor modifications are necessary to meet the claimed limitations, such as variation in hole

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concentration, such modifications are well within the purview of the skilled artisan.

Claims 22-44 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Usami et al (5,776,862).

Usami et al (5,776,862) discloses oxide superconductor and process for preparing the same. Example 1 discloses the production of $(\text{Hg}_{1-x}\text{M}_x)\text{BaCaCuO}$ wherein M is Pb, Cd or Tl (Col 3, lines 5-40). Example 2 discloses the production of Hg,Pb/Ba/Ca/CuO having a high hole density and Tc of 130K (lower than highest value) (Col 3, lines 43-67). Usami also teaches that the overdoped sample possesses higher critical current properties than optimal Tc materials (Col 4, lines 40-59).). The overdoped samples/process of preparing appear to meet each of the instantly claimed limitations.

The references are anticipatory.

In the event that any minor modifications are necessary to meet the claimed limitations, such as variation in hole concentration, such modifications are well within the purview of the skilled artisan.

Claims 22-44 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as

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obvious over Ihara et al (6,281,171), Ihara (6,444,620) or Ihara et al (5,919,735).

Ihara '171 discloses a Mg-doped high-temperature superconductor having low superconducting anisotropy which includes a two-dimensional layered structure constituted by a charge reservoir layer and a superconducting layer, wherein some or all atoms constituting the charge reservoir layer are Cu and O atoms, metallizing or rendering the charge reservoir layer superconducting, a portion of the Ca of the $\text{Cu}_{1-x}\text{Ca}_x\text{O}_{2n}$ constituting the superconducting layer is replaced by Mg, increasing superconductive coupling between CuO_{2n} layers, a thickness of the superconducting layer is increased, and therefore coherence length in a thickness direction is increased based on the uncertainty principle, lowering superconducting anisotropy (Abstract). A copper oxide represented by the formula $\text{Cu}_{1-x}\text{M}_x(\text{Ba}_{1-y}\text{Sr}_y\text{O}_{2n+4-w})$ (in which M is one or more selected from the group consisting of Tl, Hg, Bi, Pb, Au, In, Sn, Mg, Ag, Mo, Re, Os, Cr, V, Fe, and lanthanide elements, $0 \leq x < 1$, $0 \leq y < 1$, $0 \leq z < 1$, $0 \leq w \leq 4$, and $3 \leq n \leq 16$) can be cited as an example of a preferred composition for the superconductor of this invention having a two-dimensional

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layered structure (Col 4, lines 10-17). The above-described low anisotropy, high-temperature superconductor may be prepared by a known non-equilibrium method such as high-pressure synthesis, hot pressing, HIP (high-temperature isostatic processing), sealing in an oxidation resistant material, sputtering or laser ablation. The sputtering target may be a sintered material having the same composition as the superconductor to be produced, or a target may be used formed of each of the elements to be laminated in atomic layers. Sputtering or laser-ablation is performed using, for example, single-crystal substrate of $\text{SrTiO}_{0.3}$, $\text{NdGaO}_{0.3}$, $\text{LaAlO}_{0.3}$, YSZ (Y stabilized $\text{ZrO}_{0.2}$), or $\text{LaSrCaO}_{0.4}$ or the like at a substrate temperature of 300 to 800.degree. C. and an oxygen pressure of 0.01 to 1 Torr (Col 4, lines 54-68). The low anisotropy, high-temperature superconductor or the starter materials thereof may also be supplied onto the single-crystal substrate or crystal-oriented film substrate which is then sealed in a gold, silver, Inconel, Hastelloy, alumina, AlN, BN or other such oxidation resistant metal or ceramics capsule and a pressure of at least one atmosphere applied to synthesize bulk or single-crystal superconducting materials having a high critical current density J_c aligned along at least the a-axis and c-axis (Col 5, lines 20-30). Although the reference does not specifically disclose

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that the superconductors have the instantly claimed "reduction type" properties (charge layer substitutions), the materials/process would inherently possess such properties as they are of identical stoichiometry and critical temperature as the claimed materials. Additionally, the materials are produced by the same/substantially the same methods.

Such a teaching is anticipatory.

Accordingly, the burden of proof is upon applicant(s) to show that the instantly claimed subject matter is different from and unobvious over that taught by this reference. See In re Brown, 173 USPQ 685; In re Best, 195 USPQ 430 and In re Marosi, 218 USPQ 289.

In the event that any minor modifications are necessary to meet the claimed limitations, such as variation in hole concentration, such modifications are well within the purview of the skilled artisan.

Ihara '620 discloses a high-temperature superconductor having low superconducting anisotropy includes a two-dimensional layered structure of crystal unit cells each consisting of a pair of superconducting layer and charge reservoir layer. At least a portion of the atoms of the charge reservoir layer are replaced by atoms giving superconductivity, rendering the charge reservoir

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layer superconducting and lowering the superconducting anisotropy by increasing the coherence length in the thickness direction (Abstract). A copper oxide represented by the formula $\text{Cu}_{1-x}\text{M}_x(\text{Ba}_{1-y}\text{Sr}_y)_2(\text{Ca}_{1-z}\text{L}_z)_{n-1}\text{Cu}_n\text{O}_{2n+4-w}$ (in which M is one or more selected from the group consisting of Ti, Hg, Bi, Pb, Au, In, Sn, Ag, Mo, Re, Os, Cr, V, Fe, and lanthanide elements, L is one or more selected from the group consisting of Li, Na, Y, and lanthanide elements, $0.1 \leq x < 1$, $0.1 \leq y \leq 1$, $0.1 \leq z \leq 1$, $0.1 \leq w \leq 4$, and $3 \leq n \leq 16$) can be cited as an example of a preferred composition for the superconductor of this invention (Col 3, lines 59-67). The above-described low superconducting anisotropy, high-temperature superconductor may be prepared by a known non-equilibrium method such as high-pressure synthesis, hot pressing, HIP (high-temperature isostatic processing), sputtering or laser ablation. The sputtering target may be a sintered material having the same composition as the superconductor to be produced, or a target may be formed of each of the elements to be laminated in atomic layers. Sputtering or laser ablation is performed using, for example, a single-crystal substrate of SrTiO_3 , NdGaO_3 , LaAlO_3 , YSZ (Y stabilized ZrO_2), or LaSrCaO_4 or the like at a substrate temperature of 300 to 800.degree. C. and an oxygen

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pressure of 0.01 to 1 Torr. An ideal number of CuO .sub.2 layers is four to six, determined by controlling the composition ratios of the starting materials, reaction temperature, reaction time and other such conditions. The low superconducting anisotropy, high-temperature superconductor according to the present invention is characterized by a structure comprised by depositing or applying the above superconductor starting materials on the above-described single-crystal substrate or crystal-oriented film substrate which were then sealed together with a reaction promoting agent for Tl etc. and a structure stabilizing agent in a gold, silver, Inconel, Hastelloy, alumina, AlN, BN or other such oxidation resistant metal or ceramics capsule and heated at 600 to 1100.degree. C. for 0.01 to 10 hours, to thus obtain a single-crystal or crystal-oriented film aligned at least along the a-axis and c-axis with a high critical current density J_c . The superconductor starting material may also be supplied onto the single-crystal substrate or crystal-oriented film substrate, which is then sealed in an oxidation resistant capsule and heated at 600 to 1100.degree. C. under a pressure of 1 to 10 atmospheres to synthesize bulk or single-crystal superconducting materials having a high critical current density J_c aligned along at least the a-axis and c-axis (Col 4, lines 35-68). Although the reference does not specifically disclose that the superconductors

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have the instantly claimed "reduction type" properties (charge layer substitutions), the materials/process would inherently possess such properties as they are of identical stoichiometry and critical temperature as the claimed materials. Additionally, the materials are produced by the same/substantially the same methods.

Such a teaching is anticipatory.

Accordingly, the burden of proof is upon applicant(s) to show that the instantly claimed subject matter is different from and unobvious over that taught by this reference. See In re Brown, 173 USPQ 685; In re Best, 195 USPQ 430 and In re Marosi, 218 USPQ 289.

In the event that any minor modifications are necessary to meet the claimed limitations, such as variation in hole concentration, such modifications are well within the purview of the skilled artisan.

Ihara et al '735 discloses a high temperature superconductor which has a layered crystal structure, which has a superconducting transition temperature, T_c , of 110 K or more, and which has a composition expressed by: $\text{Cu}_{1-z}\text{M}'_z\text{Ae}_2\text{Ca}_{x-1}\text{Cu}_x\text{O}_y$, where M' is at least one element selected from the group consisting of (a) trivalent ions

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of Tl, and (b) polyvalent ions of Mo, W, and Re, where Ae is at least one of Ba and Sr, where x ranges from 1 to 10, where y ranges from $2x+1$ to $2x+4$, and where z ranges from $0 < z \leq 0.5$ (Abstract). The disclosed process comprises mixing the starting powders to form a mixture of a desired composition, and subjecting the powder mixture to a high pressure, high temperature synthesis involving a pressure of 100 kg/cm^2 to $100,000 \text{ kg/cm}^2$, and a temperature of 300 to $1,300^\circ\text{C}$.

C. In the above process, the starting powders may be powders formed by pulverizing sintered high temperature superconductors that have been prepared. The process for preparation of the present invention is also characterized by using a target comprising a molded high temperature superconductor or its constituent elements, and forming a high temperature superconductor film from the target on a substrate by sputtering. The process for preparation of the present invention is further characterized by using a molded high temperature superconductor as a target, and forming a high temperature superconductor film from the target on a substrate by laser abrasion (Col 3, lines 17-36). Although the reference does not specifically disclose that the superconductors have the instantly claimed "reduction type" properties (charge layer substitutions), the materials/process would inherently possess

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such properties as they are of identical stoichiometry and critical temperature as the claimed materials. Additionally, the materials are produced by the same/substantially the same methods.

Such a teaching is anticipatory.

Accordingly, the burden of proof is upon applicant(s) to show that the instantly claimed subject matter is different from and unobvious over that taught by this reference. See In re Brown, 173 USPQ 685; In re Best, 195 USPQ 430 and In re Marosi, 218 USPQ 289.

In the event that any minor modifications are necessary to meet the claimed limitations, such as variation in hole concentration, such modifications are well within the purview of the skilled artisan.

In view of the foregoing, the above claims have failed to patentably distinguish over the applied art.

The remaining references listed on forms 892 and 1449 have been reviewed by the examiner and are considered to be cumulative to or less material than the prior art references relied upon in the rejection above.


Applicant is reminded that any evidence to be presented in accordance with 37 C.F.R. 1.131 or 1.132 should be submitted before final rejection in order to be considered timely.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark Kopec whose telephone number is 703 308-1088. The examiner can normally be reached on Monday - Thursday from 8:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dr. Yogendra Gupta can be reached on 703 308-4708. The fax phone number for the organization where this application or proceeding is assigned is 703 872-9310.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 308-0661.


Mark Kopec
Primary Examiner
Art Unit 1751

MK
November 10, 2003